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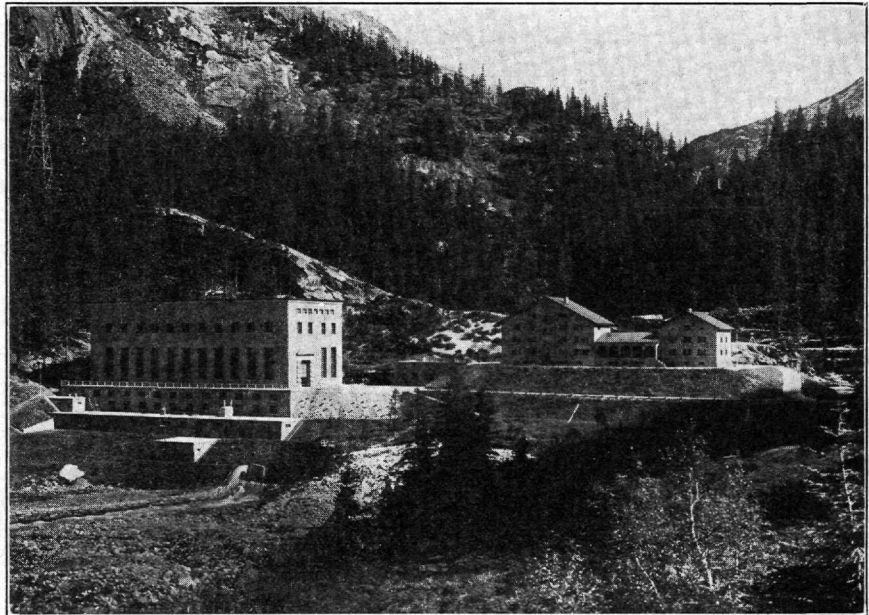
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Oberhasli Power Project

IN Switzerland, the country of the White Coal, as electricity is called there, another important step in the electrification of the country has been accomplished by the construction of a large seasonal storage plant: the Oberhasli Hydro - Electric Development above Meiringen in the Bernese Oberland. Construction work on the first step of this huge project has been completed recently and the Handeck Generating Station was turned over to regular operation on October 1, 1932.

The entire development utilizes the precipitations as well as the melting water of a total area of 43 square miles, formed mostly by the glaciers of the world renowned "Bernese Oberland". Since the natural flow of water from this area is such, that about 95 % of the total annual flow takes place during the six summer months, and only five percent during the six winter months, it was essential to create huge storage basins, in order to have the water collected during the summer available for carrying the high peak of power demand during the winter. Nature offered very favorable conditions, so that it was possible to create two large artificial lakes, the Grimsel Lake (Grimselsee) and the Gelmer Lake (Gelmersee), of a capacity of 35 billion and 450 million cubic feet respectively, corresponding to a total storage capacity of 130 million kilowatt hours. The Grimsel Lake and the Gelmer Lake are connected with each other by means of a tunnel, thus forming one huge reservoir.

The Grimsel Lake has a surface of 27 million square feet and a total length of approximately 3.5 miles. It is formed by two dams, the Seeuferegg Dam and the Spittallamm Dam. The Spittallamm Dam is the outstanding feature of the entire development, due to its



The Handeck Generating Station

tremendous dimensions, and only those familiar with the climatic conditions at an altitude of 6,300 feet above sea level know how to appreciate the difficulties under which construction work had to be going on. Due to the extreme severity of the winter, work could progress only during a few months a year, but nevertheless the dam was completed several months ahead of schedule.

The following figures may give an idea of the dimensions of the Spittallamm Dam, which at the present time is the largest in Europe:

Height above bottom of foundation	375 feet
Radius -----	295 "
Length -----	850 "
Amount of Concrete-----	12,000,000 cu-ft.

The water accumulated in the Grimsel Lake is conducted through the horizontal tunnel mentioned above to the Gelmer Lake and from there by means of a pressure line to the Handeck Generating Station. This pressure line consists of steel tubes

having a diameter of approximately 8 feet. The line is installed in a

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tunnel 3,700 feet long, leading from the Gelmer Lake to the Handeck Station, thus covering a difference of altitude of 1,750 feet at a maximum inclination of 72%.

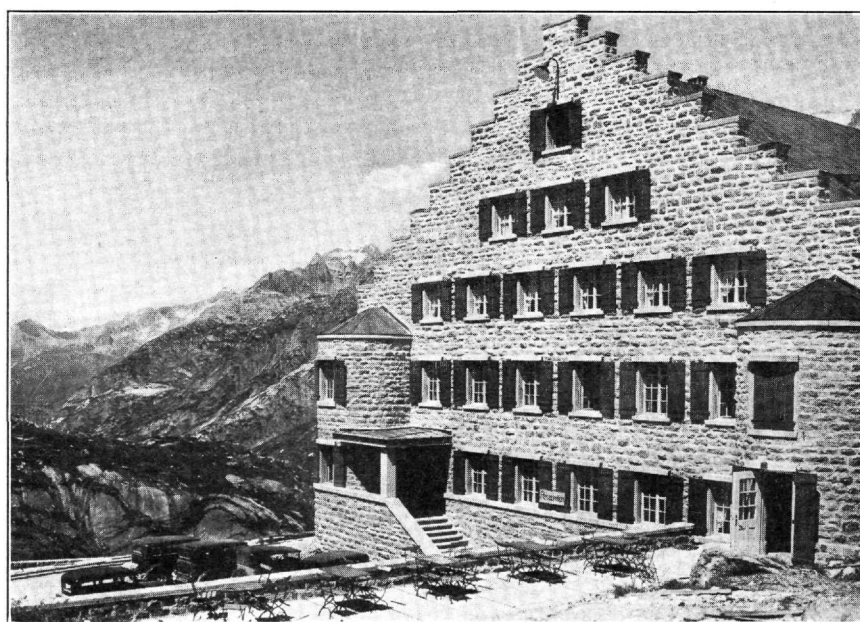
The Handeck Generating Station is equipped with four vertical type units. Each unit is composed of a Pelton type turbine of 30,000 H.P. and a generator of 28,000 kVA operating at a speed of 500 revolutions per minute and delivering power at 11,000 Volts.

The problem of delivering the power from the Handeck Station to the load center presented serious difficulties. On account of the large number of avalanches coming down in the neighborhood of the generating station regularly every winter, it was not considered safe to use high tension overhead lines, but it was finally decided that a reliable supply could only be obtained by means of underground cables. Thus a special cable tunnel of 3.1 miles has been built, connecting the generating station with the village of Guttannen. The power is stepped up at the generating station from 11,000 volts to 50,000 volts by means of four 28,000 kVA transformers and it is transmitted over four 50,000 volt cable circuits to Guttannen and from there over four 50,000 volt overhead lines to the Innertkirchen Transformer Station. The cable tunnel has been built so large as to permit the circulation of a small electric car which is the only means of communication between the generating station and the villages in the lower part of the valley during the winter season.

At the Innertkirchen Transformer Station the power is stepped up from 50,000 volts to 150,000 volts by means of four water cooled outdoor transformers, and from there it is transferred over two 150,000 volt lines to the consumers in the central part of Switzerland.

As a future extension to this development it is planned to collect the water at the turbine outlets of the Handeck Generating Station and to conduct it by means of a system of tunnels and pipe lines to another generating

station which will be built at a site near the present Innertkirchen Transformer Station. Thereby it will be possible to increase the annual production of the development from the present value of 230 million kilowatt hours to approximately 540 million kilowatt hours.



The Grimsel Hospice, near Grimsel Lake